

MATERIAL TEST **i114**

Static Tensile Test of Small Pipe

Selection of Optimal Grips and Extensometers (II)



The mechanical properties of aluminum and copper pipes, often used in air conditioners and in various precision instruments, must be evaluated in the form of their actual use.

Static tests are conducted with both ends of the pipe specimen processed flat and the center portion remaining in the form of a pipe, while conventional testing methods are performed by inserting a core into the gripped part of the specimen to prevent crushing.

Actual test conditions and test results are introduced below.

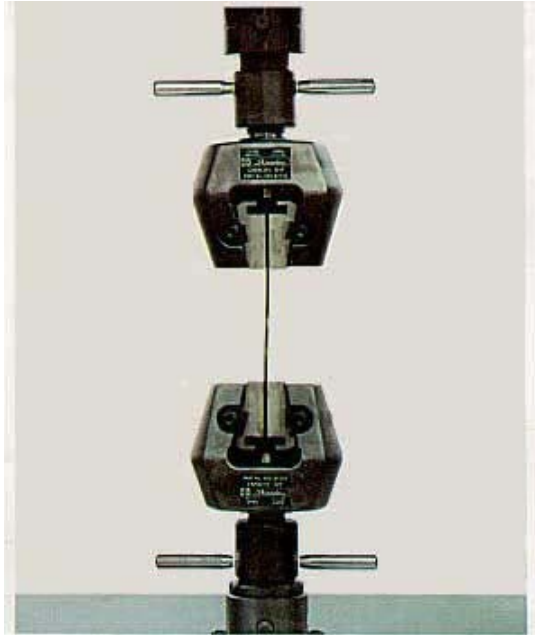


Fig.1 Grips

Specimen

Material : Copper pipe
Size : outer diam. 12.5mm, thickness 0.5mm
Optimal shape of gripped portion : Specimen is processed flat at each end. (See Fig. 2)

Testing conditions

Testing machine : Shimadzu Universal Testing Machine AUTOGRAPH
Load cell : Capacity 100kN
Testing speed : 30mm/min
Distance between grips : 300mm

Examples of optimal grips

Grip : Manual non-shift wedge type grip (See Fig.1 picture) or Hydraulic non-shift wedge type grip (for 100kN)
Grip face : Standard cross-file teeth

Extensometer for gauge length displacement

Type of extensometer : Breakage extensometer for hard specimens (measurement by magnetic scale)
Gauge length : 50mm

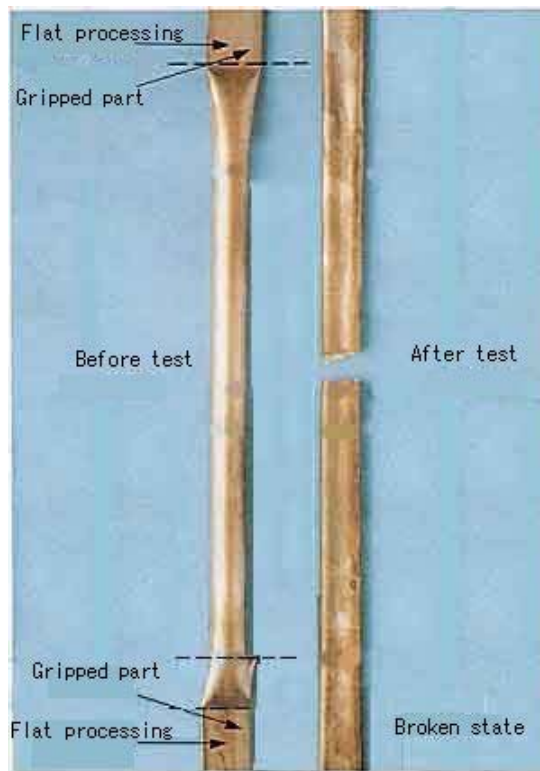


Fig.2 Broken specimen

Fig 2 shows that the specimen is normally broken not at the gripped part, but near the center of the parallel part of the specimen.

Fig.3 and Table 1 indicate that the test data (tensile strength and elongation at max. load) for four specimens had very little fluctuation and also that the breakage extensometer for hard specimens is very effective for measuring the gauge length elongation of pipe materials.

Table 1 Results

Specimen No.	Elongation at max. load		Tensile Strength		Elongation	
	kN	{kgf}	Mpa	{kgf/mm ² }	mm	%
1	3.5	358.0	225.5	23.0	100.2	33.5
2	3.5	360.0	227.5	23.2	101.5	33.8
3	3.6	370.0	230.4	23.5	100.0	33.3
4	3.5	360.0	227.5	23.2	92.0	30.6



* Please be advised that data obtained before the implementation of the current Weights and Measures Law may be presented in terms of gravimetric unit.



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